EXHIBIT A

GAI Engineers
378 Page Street – Bldg. #10
Stoughton, MA 02072-1141
(781) 297-3500/FAX 297-7050

April 28, 2003

Insured:
Hodan Properties
181 Faunce Corner Road
Dartmouth, MA 02747
Matter:
Freeze-up of Automatic Dry-Pipe Sprinkler System
Loss Site:
181 Faunce Corner Road
Dartmouth, MA 02747
Contact:
Mr. William Roland
978-774-2829
DOL: January 19, 2003
Reference: Fireman's Fund
Claim No.: 03003858835
GAI File No.: 03GR012
FIRST REPORT

VIA USPS PRIORITY MAIL

Fireman's Fund
ATTN: Mr. Joseph Fetters
P.O. Box 401
Exeter, NH 03833

Dear Mr. Fetters:

At your request, an origin & cause investigation was performed with regard to a property loss due to the freeze-up failure of and subsequent water leakage from an automatic, dry-pipe sprinkler system at the above-referenced loss site.

On January 19, 2003 at about 5:00 P.M., Mr. William Roland, general manager of the Marriott Residence Inn, was notified of an alarm of a fire at the hotel. The alarm sounded in response to the pull station in the hallway outside of Room 327. The occupant of that room noticed water leaking from the ceiling of his room and activated the pull station.

The Town of Dartmouth Fire Department responded to the scene and determined that no fire was in progress. They shut off the supply of water to the automatic, dry-pipe sprinkler system and the leakage of water eventually stopped.

Fire Suppression Services, Inc., the service group of the installer of the automatic, dry-pipe sprinkler system, Fire Suppression Systems of N.E., Inc., responded to an emergency call by the hotel manager and determined that the sprinkler system had experienced a freeze-up incident. Ice was protruding from a break in a branch, sprinkler line located in the attic space above Room 327. They left the system deactivated until their return the next day when the sprinkler system could be fully evaluated. The Town of Dartmouth Fire Department was notified of the deactivated condition of the automatic dry-pipe sprinkler system.

On January 20, 2003, Fire Suppression Services, Inc. returned to the loss site and found other branch sprinkler lines having frozen water within them. The failed branch sprinkler line was repaired by replacing the failed coupling and several sprinklers.

The following findings and opinions are presented:

1. OBSERVATIONS:

On January 22, 2003, this investigator visited the loss site and spoke with Mr. William Roland, general manager of the Marriott Residence Inn. Mr. Roland indicated to the areas affected by the water leakage and provided the events of the incident reconstruction.

Mr. Roland also provided a copy of the printout of the alarm panel readout at the time of the loss and during testing the previous months, a copy of the Fire Systems, Inc contract for fire protection equipment service, a copy of a Fire Systems, Inc. test report dated November 20, 2002, a copy of a Fire Systems, Inc. invoice dated November 29, 2002, a copy of a Fire Systems, Inc. work order dated December 10, 2002, a copy of a Fire Systems, Inc. test report dated January 16, 2003, a copy of a facsimile dated August 7, 2002 from Fire Suppression Systems of N.E., Inc. to Pro Con Construction providing system acceptance documentation, and a copy of a work order dated January 19, 2003 from Fire Suppression Services. Inc describing work to be provided to investigate and repair damage due to a dry-pipe sprinkler system freeze-up.

The subject, building is a wood and steel framed, wood clapboard sided, three story, multi-room, asphalt shingle and multi-hip and multi-gable roofed, hotel with an unheated attic above. The hotel is about a year old and has been open for occupancy since May of 2002. According to Mr. Roland, construction of the hotel began in August of 2001 and the general contractor was Pro Con Construction (1359 Hooksett Road, Hooksett, NH 03106, 603-623-8811). Fire Sup-

pression Systems of N.E., Inc, installed the automatic dry-pipe and wet-pipe sprinkler systems. Paquette Electric was the electrical sub-contractor and they sub-contracted the fire alarm panel to TEC. On October 24, 2002, Marriott Residence Inn contracted Fire Systems, Inc. to provide the inspection and testing of the wet-pipe sprinkler system, the dry-pipe sprinkler system, a sprinkler flow switch, sprinkler pressure switches, sprinkler tamper switches, the fire alarm panel, smoke detectors, manual stations, a heat detector, and signaling devices.

Fire Systems, Inc. tested and inspected the fire protection systems of the hotel on November 20, 2002 and January 16, 2003. From the test/inspection reports, water flow tests were performed for the dry-pipe system on both dates. Mr. Roland confirmed the flow of water streaming from the remote test station outlet at the time of the later date. Water staining was observed on the sidewalk and grounds in the area of the outlet. According to the test/inspection report of the earlier date, the Town of Dartmouth Fire Department received test alarm signals and the monitoring system was restored to normal. According to the test/inspection report of the later date, the Town of Dartmouth Fire Department did not receive test alarm signals and the monitoring system was restored to normal.

The Marriott Residence Inn has an automatic, wet-pipe sprinkler system and an automatic, dry-pipe sprinkler system. The automatic, dry-pipe sprinkler system protects the unheated and vented attic space and the roof structure. The automatic, wet-pipe sprinkler system protects the heated spaces of the building. It is possible that some sections of the automatic, dry-pipe sprinkler system protects some areas of the heated spaces.

Other than the subject, dry-pipe sprinkler system, there are no reports of other failures of the components of the plumbing system, heating system, and automatic wet-pipe sprinkler system. The air compressor for the automatic, dry-pipe sprinkler system is not reported to have failed or stopped operating at the time of the loss and no power failures were reported.

The sprinkler valve room is centrally located to the footprint of the hotel. The air compressor for the automatic, dry-pipe sprinkler system was powered on the day of the site visit and was not operating excessively. The water side pressure at the dry valve was about 70 psig and its dry side pressure was about 40 psig. The automatic, dry-pipe and wet-pipe sprinkler systems and the electrical and mechanical systems were functional on the day of the site visit and reported to be functional at the time of the loss. According to system acceptance documentation, the sprinkler systems and the alarm system and their appurtenances were tested and certified before the building was given an occupancy permit.

In general, the subject, automatic, dry-pipe sprinkler system runs up from the first floor sprinkler valve room at a location somewhat central to the building footprint. From there, smaller sprinkler mains run to all sections of the attic and connect to branch sprinkler lines that, in turn, connect to smaller and smaller branch sprinkler lines. The location of the branch sprinkler lines and the building construction allows for the lines to be sloped toward the sprinkler mains and main drain. The branch sprinkler line that failed and the branch sprinkler lines reported to have frozen have sufficient slopes to avoid the collection and freezing of water within them, especially in light of photographs showing the failed sprinkler line completely filled with ice. Although not needed, a low point drain was installed in the vicinity of Room 327 to better facilitate the draining of the sprinkler system. There are no indications that the slopes of the frozen sprinkler lines were altered after the loss.

On the day of the site visit, an electrician for Paquette Electric checked the wiring of the low/high air pressure switch and the alarm pressure switch of the automatic, dry-pipe sprinkler system. These two pressure switches were wired incorrectly such that the alarm panel would not be able to interpret a fault signal from them. Consequently, no alarm signal, particularly that signaling the flow of water through the sprinkler system at the time of the second service call, was sent to an alarm company and the Town of Dartmouth Fire Department.

Weather data for April of 2002 through January of 2003 were reviewed. The months of April through November of 2002 had no days when the temperatures were low enough below the freeze point of water and for a long enough period of time to freeze entrapped water, if present in the sprinkler pipes of the subject, sprinkler system in the attic.

The first time period before the loss with potential for a freeze-up incident, 16-32 degrees Fahrenheit, occurred on December 2-6, 2002. No freeze-ups occurred at this time. The next time period before the loss with potential for a freeze-up incident, 2-30 degrees Fahrenheit, occurred on January 13-19, 2003. No freeze-ups occurred until January 19, 2003.

2. ANALYSIS:

According to the current 780 CMR, Massachusetts State Building Code, all fire protection systems required by 780 CMR shall be installed, repaired, operated, and maintained in accordance with 780 CMR and ANSI/NFPA 13, Standard for the Installation of Sprinkler Systems and ANSI/NFPA 72, National Fire Alarm Code . According to ANSI/NFPA 13, new automatic, dry-pipe sprinkler systems must be hydrostatically tested, pneumatically tested, and flow tested as part of the system's acceptance. According to ANSI/NFPA 72, new alarm systems must

be tested. The various sections of the subject, automatic, dry-pipe sprinkler system were completed and certified at various times during the period of January to June of 2002 (certification documents provided). Fire Suppression Systems of N.E., Inc. performed the sprinkler system installation work that was tested and certified. Paquette Electric, and TEC performed the fire alarm system installation work that is presumed to have been tested and certified (certification documentation not provided).

According to ANSI/NFPA 13 and ANSI/NFPA 25, Inspection, Testing, and Maintenance of Water Based Fire Protection Systems, sprinkler systems must undergo periodic tests of which some require the sprinkler system to be filled with water. Seasonal and environmental changes sometimes result in condensation being formed within the sprinkler piping. This condensate as well as residual water from tests must be removed prior to the onset of outdoor temperatures below the freeze point of water. Compressed air is sometime used, especially during cold weather, to remove water from a dry-pipe sprinkler system. Usually sprinkler service companies do not allow test water to enter a dry-pipe sprinkler system during the winter and only perform this type of test during warmer weather.

According to ANSI/NFPA 13, all sprinkler pipe and fittings shall be so installed that the system may be drained and, in a direction toward the main drain, where practical. On dry-pipe systems, sprinkler pipe on branch lines shall be pitched at least $^1/_2$ inch per 10 feet. An exception is allowed with the use of auxiliary drains when a change in piping direction prevents practical drainage of sections of branch lines or mains to the main drain.

The subject, sprinkler system appeared to be constructed with many sections of the sprinkler piping sloped down toward the main drain. Fire Systems, Inc. serviced the sprinkler and alarm systems on November 20, 2002 and January 16, 2003.

After the first service call by Fire Systems, Inc. on November 20, 2002, cold temperatures occurred on December 2-6, 2002. There are no reports of sprinkler or alarm system problems during this period of cold weather. It is probable that the automatic dry-pipe sprinkler system was drained properly prior to this cold weather period.

At the time of the second service call by Fire Systems, Inc. on January 16, 2003, three days before the loss, cold temperatures occurred on January 13-19, 2003. As a freeze-up incident occurred three days after this servicing, it is probable that not all of the branch lines of the subject, sprinkler system were completely drained of water. This could have happened because the sprinkler system was not drained at all or was not allowed enough time to completely drain.

At the time of the servicing and following freeze-up failure, the outside air temperature and the indoor air temperature of the ventilated attic were below the freeze point of water. Cold air made its way into the attic through the ridge and soffit vent system, and to the location of the subject sprinklers.

When the ambient air temperature drops most piping or tubing materials contract slightly, and the water therein will also contract, for the most part, along with the pipes. Once water reaches 39.2° F., it starts to expand, **as a liquid**, until it reaches 32.2° F. when it is cold enough to form ice. The ice formation, through the latent heat of fusion, expands the volume about 9.3% larger than it occupied before, at the same temperature. This has the effect of dramatically increasing the internal pressure in the pipe, albeit slowly, depending upon the drop in air temperature.

The internal pressure increase is not necessarily confined to the area of ice formation, but can occur between an ice formation and a closed section of the line. As such, the failure of a line component does not always occur at the section of the line where ice forms.

Typically, pipe fittings of sprinkler lines fail first as they are weaker in strength and design than pipes of the same material. They are sometimes of a different material, e.g. cast iron, that is more brittle. The fracture for this material is usually smooth grained with little deformation. The fracture split for a freeze-up is almost always parallel to the axis of the pipe or fitting. Sometimes, the intersecting axes of a fitting will alter this typical fracture orientation and the break will be across the circumference. Sometimes, sprinklers fail or leak as their elements are also weaker than pipe. They can fail at the time of the loss or some time thereafter.

For this loss, the pressure devices that respond to and signal the alarm panel of the occurrences of a drop in air pressure and the flow of water within the automatic dry-pipe sprinkler system were wired incorrectly. The incorrect wiring was performed sometime after the sprinkler and alarm systems were certified. This could have occurred at the time of the first service call of Fire Systems, Inc, but it is probable that it occurred at the time of the second service call three days before the freeze-up incident.

3. CONCLUSION:

Based on the above findings, it is the considered, professional opinion of this investigator that the origin of this loss is an automatic, dry-pipe sprinkler system located in a vented attic that froze and failed with a release of water from it, and the probable cause of the failure is an inadequate draining of test waters from

the sprinkler system a few days before the loss during a period of below freezing air temperatures outside and consequently inside the attic.

Unless requested to do otherwise, this report will conclude GAI's activity on this claim and an invoice for services rendered is enclosed. GAI reserves the right to alter or supplement this report if additional information is provided.

Excellence in service is important to GAI, and should you have any questions or comments, please feel free to call us at the telephone number listed above.

We appreciate your consideration in using our services.

Thank you.

Sincerely,

Richard R. Papetti

Richard R. Papetti, P.E.

Encl.
Cc: Ms. Amy Schneider, Craig Insurance Services